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sity (photopathic reaction), and is not, as far as is known, a color response (chromopathy).

G. H. P.

**Embryology of the Cladoceran *Penilia*.**—The development of *Penilia* has been studied by M. T. Sudler.<sup>1</sup> The four to six oval eggs of a single laying are usually so placed in the brood sac of the female that their long axes are very nearly parallel to that of the female. The long axis of the egg corresponds to that of the future embryo, and the end of the embryo pointed forward in the brood sac becomes the head. The segmentation of *Penilia* is total and remains so throughout in strong contrast to that in most other Crustacea. As in *Nereis*, the first cleavage plane is transverse to the chief axis of the future embryo; the second is in the sagittal plane; and the third is at right angles to both previous planes; the fourth is parallel to the first; and from the fifth on, no clear characterization can be made. Gastrulation takes place in definite relation to the maternal body, *i.e.*, at what may be described as the outer posterior corner of the embryo. The mesoderm originates from either side of the mid-ventral line, and in a way that prevents it from being clearly distinguished from the entoderm for some time. The gastrula mouth closes in the region afterwards occupied by the anus. The order of appearance of the appendages is open to some variation, but is usually as follows: second antenna, first antenna, mandible, first maxilla, second maxilla, thoracic appendages in sequence from the anterior end. Organogeny is briefly dealt with. The reproductive organs cannot be traced to a single cell, as in *Moina* according to Grobben. On the whole, *Penilia* gives evidence of being a highly specialized rather than a primitive cladoceran.

G. H. P.

**Artificial Parthenogenesis in the Sea Urchin.**—Observations on the influence that various dissolved substances have on living muscle and on the fertilized and unfertilized eggs of marine animals have led Loeb<sup>2</sup> to suspect that the reason unfertilized eggs do not develop is not only because of lack of the spermatozoan, but also because of the constitution of the sea water. The addition of magnesium chloride to sea water (5000  $\frac{1}{8}$  n  $\text{MgCl}_2$  in 5000 cc. of sea

<sup>1</sup> Sudler, M. T. The Development of *Penilia schmackeri*, Richard, *Proc. Boston Soc. Nat. Hist.*, vol. 29, pp. 109–131, 3 plates. October, 1899.

<sup>2</sup> Loeb, J. On the Nature of the Process of Fertilization and the Artificial Production of Normal Larvæ (Plutei) from Unfertilized Eggs of the Sea Urchin, *Amer. Journ. Physiol.*, vol. iii, pp. 135–138. October, 1899.